

REMARKS

This Amendment is submitted in reply to the non-final Office Action mailed on January 3, 2006. A petition for a one month extension of time is submitted herewith. The Director is authorized to charge \$120.00 for the petition for extension of time or any additional fees which may be required, or to credit any overpayment to Deposit Account No. 02-1818. If such a withdrawal is made, please indicate the Attorney Docket No. 112701-587 on the account statement.

Claims 1-17 are pending in this application. Claims 13-17 were previously withdrawn. In the Office Action, Claims 1-12 are rejected under 35 U.S.C. §103. In response Claim 1 has been amended, and Claims 2 and 7 have been canceled. This amendment does not add new matter. In view of the amendment and/or for the reasons set forth below, Applicants respectfully submit that the rejections should be withdrawn.

In the Office Action, Claims 1-12 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,629,042 to *Serpelloni* et al. ("*Serpelloni*") in view of U.S. Patent No. 5,314,708 to *Gonze* et al. ("*Gonze*") and U.S. Patent No. 4,154,867 to *Aldrich* et al. ("*Aldrich*"). Applicants believe this rejection is improper and respectfully traverse it for at least the reasons set forth below.

Independent Claim 1 is directed, in part, to a method comprising: (i) forming a liquid starting material comprising water, the at least one acidic component, and the at least one sugar alcohol which is not a monosaccharide sugar alcohol; (ii) evaporating water from the liquid starting material under conditions at which the acidic component does not cause significant hydrolysis of the sugar alcohol to dissolve the acidic component in the liquid and to remove at least part of the water to form an intermediate material, wherein the evaporating is carried out at a temperature that does not exceed 145°C; and (iii) cooling the intermediate material to form a glassy amorphous solid that has improved transparency compared to a glassy amorphous solid that does not contain an acid, wherein the water content is reduced to below 3%. The amendment is supported in the specification, for example, at page 4, line 17-18 and page 6, lines 1-2. In contrast, Applicants respectfully submit that the cited references are deficient with respect to Claim 1.

As taught by Applicants in the specification, hard candy is generally made by a process in which a mixture of the sugar or sugar alcohol and water is heated, generally under vacuum, at a

temperature of about 130-150°C. The resulting mixture can still be worked and formed into confectionery products as desired and on cooling forms a glassy amorphous solid with a water content of less than 3%. Hard candy generally contains other ingredients some of which are acidic. Sugar alcohols which are not monosaccharide sugar alcohols show some susceptibility to acid hydrolysis, and so acid components are conventionally added towards the end of the heat treatment. However, hydrolysis of the sugar alcohol can still occur which in turn results in a sticky, hygroscopic product and/or crystallization of the candy. In addition, by the time that the acid component is added, the water content of the mixture has been reduced, generally to around 2% or less. The acids are conventionally added as powder rather than pre-dissolved in water to avoid introducing additional water which would remain in the final composition, possibly with detrimental effects on the quality of the final product, but this has the consequence that dissolution of the acid may be difficult or incomplete. As a result of these factors, there is a tendency of the hard candy to be opaque.

One example of a commercially available sugar alcohol commonly used as a sugar substitute is Isomalt which is made by enzymatic rearrangement of sucrose followed by hydrogenation. Isomalt is a mixture of the isomers 1-O- α -D-glucopyranosyl-D-mannitol dihydrate and 6-O- α -D-glucopyranosyl-D-sorbitol. In the processing of Isomalt into hard candy, flavor, color and citric acid are added at the cooling stage of the process after cooking is complete.

U.S. Pat. No. 3,738,845 relates to a process for the preparation of clear sorbitol hard candies confections which prevents the crystallization of sorbitol by addition of an organic acid, prior to the completion of the cooking step, which is carried out to a temperature of at least 300°C (about 149°C).

The glassy amorphous solid will be referred to hereinafter as hard candy. It has surprisingly been found that acidic component(s) which have conventionally been found to hydrolyze the sugar alcohol can be added from the start of the process for the manufacture of hard candy provided that conditions are used in the process under which the acid does not hydrolyze the sugar alcohol. Generally this will involve the use of a vacuum evaporator to reach the desired final moisture content at a temperature which is low enough to avoid hydrolysis of the sugar alcohol. As a result the problems referred to above are alleviated and the hard candy shows improved transparency.

Preferably, the evaporation is carried out at a temperature not exceeding 148°C, more preferably, not exceeding 145°C. Thus, the present invention relates to a method for preparing a hard candy which includes at least one acidic component and which shows improved transparency is made by forming a liquid starting material comprising at least one sugar alcohol which is not a monosaccharide sugar alcohol, water, and the acidic component; heating under conditions not above 148°C, preferably not above 145°C, at which the acidic component does not cause significant hydrolysis of the sugar alcohol to dissolve the acidic component in the liquid and remove at least part of the water; and cooling to form the hard candy with a final water content below 3%.

Serpelloni is deficient with respect to Claim 1 in at least four aspects: 1) *Serpelloni* fails to disclose or suggest the addition of an acid component to the reaction mixture; 2) *Serpelloni* fails to disclose or suggest any conditions at which the acidic component does not cause significant hydrolysis of the sugar alcohol to dissolve the acidic component in the liquid as in the present invention; 3) *Serpelloni* fails to disclose or suggest the water content is reduced to below 3%; and 4) *Serpelloni* discloses that the mixtures of polyols are usually boiled at from 150°C to 200°C and fails to disclose or suggest that the evaporating is carried out at a temperature that does not exceed 145°C. In addition to the above differences, the objects of the two inventions are completely different. The object of *Serpelloni* is to prevent the uptake of water into the boiled sweet whereas an object of the present invention, for example, is to obtain a product having improved transparency.

As stated at column 1, lines 4-7, *Serpelloni* relates to a new sugar-free boiled sweet having a water content greater than the usual contents for this type of confectionery and having, in spite of this high water content, a very high stability. The passage extending from column 1, line 52 to column 2, line 11 reads:

"Now, sugar-free boiled sweets are unfortunately not stable products from a thermodynamic point of view. The extent of their variation depends essentially on their composition after manufacture, but also on the conditions under which they are preserved.

Firstly, sugar-free boiled sweets may become sticky products during storage. When they are wrapped, it then becomes difficult or even impossible to remove their wrapping materials before they are consumed. They may also cake without remaining individualized, which is even more troublesome.

This problematic variation towards a sticky and syrupy state can be explained by surface phenomena and/or by depth phenomena.

The origin of the surface phenomena is in the hygroscopic nature of boiled sweets. It is indeed known that boiled sweets, which are in essence practically anhydrous products, always have very low equilibrium relative humidities, substantially lower than the usual ambient relative humidities for storage. This explains why an uptake of water necessarily occurs at the surface of the sweets as soon as they are and remain exposed to air, as is the case for lollipops for example. When this water uptake is sufficiently high, it tends to liquefy the surface of the sweets and to impart on them the characteristics of a syrup, that is to say in particular to impart on them a sticky character. The lower the water content of the boiled sweets, the quicker this variation appears." (emphasis added.)

Serpelloni explains what is meant by "a water content greater than the usual contents for this type of confectionery" in the passage at column 3, lines 1-28, which reads as follows:

"For sugar-free boiled sweets, it has always been considered that this value of the water content was the most essential characteristic to be taken into account. This is clearly indicated for example in Patents EP 094,292; EP 518,770 and EP 611,527, where a value which is always less than 3% is recommended in order to obtain sufficiently stable products.

No stable sugar-free boiled sweet is known which contains more than 3.0% of water, except certain sorbitol sweets which are grained products right from their manufacture.

Up until now, it seems that no viable solutions exist which make it possible to prepare essentially amorphous sugar-free boiled sweets which are high in water and are stable. Such products would nevertheless be advantageous in many respects, especially because of the fact that they would be of a lower cost for a quality identical to or even better than that of commercially available products.

The aim of the invention is to overcome the disadvantages of the prior art and to provide a new sugar-free boiled sweet which satisfies, much better than existing products, the expectations of confectionery manufacturers and the various requirements of practical use, that is to say having a substantially improved storage stability.

At the end of detailed research studies, the merit of the applicant company is to have found that this aim could be achieved and that, against all expectations, it was possible to prepare

a sugar-free boiled sweet which is stable although containing a high water content, that is to say greater than 3%." (emphasis added.)

Serpelloni also states at column 4, lines 11-21:

"The sugar-free boiled sweet according to the invention is characterized in that it contains more than 3% of water and a particular composition of carbohydrates which are suitable for conferring on it a glass transition temperature at least equal to 38°C, this temperature being measured for a water content of about 3.2%. Advantageously, this sugar-free boiled sweet contains more than 3.2%, more preferably more than 3.5% and still more preferably more than 4.0% of water. Compared with known sugar-free boiled sweets, it has the advantage of being able to be produced by boiling at a temperature which is not very high." (emphasis added.)

Aldrich is also deficient with respect to Claim 1 for at least the following reasons: 1) *Aldrich* fails to disclose or suggest any conditions at which the acidic component does not cause significant hydrolysis of the sugar alcohol to dissolve the acidic component in the liquid because in all the Examples *Aldrich* uses temperatures of 330-335°F (about 165°C to 167°C). (in contrast, in the present invention the maximum temperature is 145°C); 2) *Aldrich* teaches away from using other acids such as citric acid, which are suitable in the present invention; 3) *Aldrich* discloses the use of sorbitol (e.g. a monosaccharide sugar alcohol) as the preferred sugar alcohol whereas in the present invention the sugar alcohol used is not a monosaccharide sugar alcohol; 4) the acid is not added at the start of the process (see Example 1 where malic acid is added later) as it is in the present invention; and 5) *Aldrich* is wholly silent on the water content of the product. In addition to the above differences, the objects of the two inventions are completely different. The object of *Aldrich* is to improve the flavor whereas an object of the present invention is to obtain a product having improved transparency.

Aldrich states at column 1, lines 40-44, "[s]urprisingly, in accordance with the present invention, the above flavor problems associated with the use of citric acid in combination with hydrogenated starch hydrolysates and sorbitol has been resolved by replacing the citric acid with malic acid."

The Patent Office asserts that it would have been obvious to one of ordinary skill in the art to modify *Serpelloni* with *Aldrich* by incorporating an acid in the confectionery to enhance the flavor. Applicants respectfully disagree and submit that a person of ordinary skill in the art seeking to improve the transparency of a hard candy would not be motivated to combine

Serpelloni and *Aldrich* to arrive at the present claims because they fail to disclose or suggest every element of the present claims and actually teach away from the present claims. For example, *Serpelloni* teaches how to prevent the uptake of water into the boiled sweet in the absence of acid and teaches heating the ingredients under conditions at which the acidic component causes significant hydrolysis of the sugar alcohol, while *Aldrich* teaches how to improve the flavor of the product using substantial amounts of hydrogenated starch hydrolysates, teaches heating the ingredients under conditions at which the acidic component causes significant hydrolysis of the sugar alcohol, and teaches that citric acid and other acids are unsuitable. As a result, there is no guidance in the combination of these teachings that would lead a person of ordinary skill in the art, seeking to improve the transparency of a hard candy to use a sugar alcohol which is not a monosaccharide sugar alcohol with an acidic component which includes citric acid, and heating the ingredients under conditions at which the acidic component does not cause significant hydrolysis of the sugar alcohol to dissolve the acidic component in the liquid.

Further, *Gonze* is deficient with respect to Claim 1 for at least the following reasons: 1) *Gonze* fails to disclose or suggest the addition of an acid component to the reaction mixture; 2) *Gonze* fails to disclose or suggest any conditions at which the acidic component does not cause significant hydrolysis of the sugar alcohol to dissolve the acidic component in the liquid as in the present invention because *Gonze* does not add acid; and 3) *Gonze* fails to disclose or suggest that the evaporating is carried out at a temperature that does not exceed 145°C. In addition to the above differences, the objects of the two inventions are completely different. The object of *Gonze* is to prevent moisture pickup on storage whereas an object of the present invention is to obtain a product having improved transparency.

The Patent Office asserts that it would have been obvious to one of ordinary skill in the art to modify *Serpelloni* with *Gonze* by utilizing a process temperature as disclosed by *Gonze* in order to prevent moisture pickup on storage. Applicants respectfully disagree and submit that a person of ordinary skill in the art, seeking to improve the transparency of a hard candy would not combine *Serpelloni* and *Gonze* to arrive at the present claims because they fail to disclose or suggest every element of the present claims and actually teach away from the present claims. For example, *Serpelloni* aims to prevent the uptake of water into the boiled sweet and does not use acid, teaches heating at 150°C to 200°C (conditions at which the acidic component causes

significant hydrolysis of the sugar alcohol), and teaches that the water content of the hard-boiled candy is greater than 3% and preferably greater than 4%. *Gonze* aims to prevent moisture pickup on storage, does not use acid, and teaches processing temperatures of above 148°C which, if acid were present, would cause significant hydrolysis of the sugar alcohol. As a result, there is no guidance in the combination of these teachings that would lead a person of ordinary skill in the art, seeking to improve the transparency of a hard candy to use a sugar alcohol which is not a monosaccharide sugar alcohol with an acidic component, and heating the ingredients under conditions at which the acidic component does not cause significant hydrolysis of the sugar alcohol to dissolve the acidic component in the liquid.

For the reasons discussed above, the combination of *Serpelloni*, *Aldrich* and *Gonze* is improper. Moreover, *Serpelloni*, *Aldrich* and *Gonze* do not teach, suggest, or even disclose all of the elements of Claim 1 and Claims 2-12 that depend from Claim 1, and thus, fail to render the claimed subject matter obvious for at least these reasons.

Accordingly, Applicants respectfully request that the obviousness rejection with respect to Claims 1-12 be reconsidered and the rejection be withdrawn.

For the foregoing reasons, Applicants respectfully request reconsideration of the above-identified patent application and earnestly solicit an early allowance of same.

Respectfully submitted,

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